A CHARTLESS RECORD - IS IT ADEQUATE?

W.W. Stead, M.D., W.E. Hammond, PhD, and M.J. Straube

Box 2914
Duke University Medical Center
Durham, N.C. 27710

Abstract

The computerized medical record supported by The Medical Record (TMR) has been the only record of physician patient encounters on the nephrology service of the Durham Veteran's Administration Medical Center since April 1981. Physicians using the system evaluated the adequacy of the computerized record as a replacement for the paper chart. The computerized record was able to capture and display all pertinent data. Manual or computerized narratives provided a useful supplement to the core computerized record only in those rare instances that a physician needed to point out which of the data in the record were important to his decision making.

Introduction

After fifteen years of false starts, computerized medical records are a reality. We must now determine whether computerized records should replace or merely supplement the paper chart. The question arises because a computerized medical record must be organized differently than the paper chart if it is to be more useful than the paper chart. The paper chart is the unorganized repository of each slip of paper containing thought or fact relating to a patient. The computerized medical record must be carefully organized and terse if it is to improve on the presentation of data to physicians and thereby aid in preventing the overlooking of important findings, emphasizing trends, and allowing detailed subgrouping for clinical research. Advances in hardware and software technology have reduced the rigidity inherent in using a computer, but they have not modified the requirement that a useful record must be disciplined.

Achieving discipline in medical records is a difficult task because it requires changing physician work habits, but it can be done. Shifting to an effective computerized record involves teaching the physician to structure data, standardize vocabulary, and discard information of no or transient importance. We can now step back from developmental efforts and examine the problems of practicing medicine with a computerized chartless record.

Since April 1981, all patients seen by the nephrology service of the Durham Veteran's Administration Medical Center have been managed with a computerized medical information system, The Medical Record (TMR) [1,2]. As the medical record was implemented in the nephrology clinic, patients were randomized to follow-up with either the manual record or the computerized chart, and the computerized record was found to improve the physician's awareness of important data about his patients [3]. The computerized records have also been shown to change the way a clinician makes decisions [4]. This paper presents the content of the computerized record supported by TMR, the specific areas in which physicians have found the discipline of computerized records inhibiting, and the steps that have been taken to improve acceptance.

The TMR Record

The TMR system is written in GEMISCH and is operational on Digital Equipment Corporation's family of PDP-11 and VAX computers under the IAS, RSX-11M+, VAX/VMS, and UNIX operating systems. TMR is a comprehensive medical information system which manages a patient's encounter from the time an appointment is made, through diagnostic evaluations and treatment, to the closing of the account. TMR consists of a set of functional modules which are controlled through a user-defined data dictionary.

A complete list of problems, diagnoses and procedures, including the cause, if known, and dates of onset, resolution, and recurrence, is the centerpiece of the medical portion of the record. Subjective and physical findings

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are recorded either as absent or as present with location, degree of severity, and description. The results of all studies are recorded using numbers, standard abbreviations or codes. Full prescribing information is maintained on each current therapy, as well as the daily dose, start and stop dates, and side effects of past therapies and the dates of immunizations. All data recorded in the body of the medical record is coded, but narrative modifiers are permitted to add flavor. Data may be reviewed in problem-oriented, time-oriented, or encounter-oriented formats. A computerized note pad is provided to allow the physician to make transient narrative comments. Automated histories and protocols are supported to collect information of interest for a specific problem or study.

Use of the Record in Nephrology Clinic

The TMR system has been integrated into the nephrology service in phases, beginning with the administrative package, followed by the modules handling laboratory data, therapies, problems and subjective and physical findings. Since April 1981 the computer record has been the only record of a patient's encounter with the service.

Prior to a clinic visit, the program reviews the patient's record and generates a preencounter report (Fig. 1) for the physician. Initially the report contained demographic data, a list of the patient's problems, a list of the subjective and physical findings being followed on a patient, current therapies, pending studies and prior assessments or plans. This report was designed to transmit and capture data simultaneously. For example, the last result of a finding is printed with the request for today's value.

A video terminal is available in clinic, and physicians are encouraged to enter their prescriptions interactively. The program aids the physician by changing brand names to generic names, prompting with the forms and amounts of the medicine that are available in the pharmacy, and indicating if a patient is allergic to a medication or taking another medication that would interact with one being prescribed. The physician is also encouraged to use the video terminal to review a record in more depth than provided in the preencounter report. Displays are available which show the last value of each item that has been evaluated for a patient, graphic representations of any item over time, and the items necessary to evaluate a particular problem.

Physician Response to the Record

After the computerized record had been in place for ten months, the physician staff met to discuss the problems encountered while trying to take care of patients with the computer-generated record. The predominant complaint was that the preencounter report was restrictive and did not encourage recording a complete medical workup. Most internists have been trained to record a complete history and physical when they are getting to know a patient. Instead of being all inclusive, TMR prompts for a focused set of symptoms and physical findings based upon a patient's problems and prior findings.

The physicians felt that it was difficult to record general thoughts about a patient's condition and diagnostic or therapeutic alternatives. When a patient first presents to a doctor with a complaint, it is frequently difficult to arrive at a specific diagnosis. In a paper record, the physician is able to indicate that the patient appears to have one of several problems and that the appropriate workup will be done. The computer record seemed permanent to our physician group, and they hesitated to record diagnostic possibilities until they were confirmed.

The physicians stated that the computer record did not allow them to indicate the logic by which they arrived at a specific conclusion. A nephrologist dictates a narrative note specifying why a particular patient should not receive dialysis treatments. The TMR preencounter report captures the medical and psychosocial problems that a patient has which would interfere with dialysis and documents whether the patient is being rejected as a dialysis candidate for medical or psychosocial reasons, but it does not let the physician write a dedicated paragraph. No data about the patient is lost, but the physician is not able to underline the pieces of information that were critical in his judgment.

To determine which information would be recorded by a physician in a paper chart, but not on the computer report, we attached blank progress note paper to each computer report and told the physicians to make notes whenever they felt the computer report was inadequate. During 21 of 194 consecutive encounters (11%), the physicians wrote traditional notes. Thirteen of these notes were about

THE NEPHROLOGY SERVICE
Category: HOME HEMO/
Primary MD: WILLIAM STEAD 4-100
Occupation:
Employer:

Appointment: 14:30 - WILLIAM STEAD

10/12/81 10:07

RV
WWS

* BROWN
* CHARLES F.
* 12 SHULTZ BLVD.
* PATTFORD, GH. 21456
*002-123-1234
* Birthdate: 11/23/32
* 999-99-9977
*
* 48 yo wh div male
****

ONSET	RESOLVED	SEEN	CODE	ALL PROBLEMS
04/23/70	04/24/70	__	189	APPENDECTOMY
01/23/72	________	__	6	GLOMERULONEPHRITIS-MEMB
05/02/76	06/05/77	__	164	NEPHROTIC SYNDROME
02/15/81	________	__	18	RENAL FAILURE (CHRONIC)
02/15/81	________	__	1	HYPERTENSION-DIASTOLIC
02/15/81	________	__	125	ANEMIA
02/15/81	________	__	132	ACIDOSIS (METABOLIC)
06/25/81	________	__	169	DIALYSIS THERAPY
________	________	__	____	________________________________
________	________	__	____	________________________________

SUBJ/PHY	DATE	LAST VALUE	TODAY'S VALUE
PRURITIS	09/10/81	MLD	MLD; MOD; SEV; N
NAUSEA	09/10/81	N	YN ____________________
PAIN FLK			RT; LT; BILAT; N
WT	09/10/81	74 KG	# ____________________
WT DRY	09/10/81	74 KG	# ____________________
TEMP		C	# ____________________
PULSE SIT		MIN	# ____________________
BP SIT	09/10/81	140/90 MM	#/# ____________________
ART NAR	09/10/81	MOD	MLD; MOD; SEV; N
EDEMA PED	09/10/81	0	0-4 ____________________
RFLEX AKR	09/10/81	2	0-4 ____________________
VIB LE	03/25/81	NL	INC; DEC; NL
KARNOF	03/25/81	95 %	# ____________________
__________	________________		! __________ __________
__________	________________		! __________ __________
__________	________________		! __________ __________

----------------------------CURRENT THERAPIES--------------------------

THERAPY	DISP	RF	START	END	
BASALJEL 620 MG C 3 QID /C MEALS & SNACK	360	1	06/25/81	11/09/81	S R C
CALCITRIOL .25 MCG C 1 GAM	30	2	05/02/81	12/09/81	S R C
TABRON 1 T 1 BID	60	2	06/25/81	12/09/81	S R C
FLUOXYMESTERONE 10 MG T 3 GAM	90	2	06/25/81	12/09/81	S R C
TRIMEPRAZINE TARTRATE 2.5 MG T 1 G6H PRN ITCHING	30	2	09/10/81	12/09/81	S R C
DIOCTYL NA SULFOSUCCINATE 100 MG C 2 PO BID	120	2	02/15/81	12/09/81	S R C

<u>Fig. 1a:</u> Pre-encounter Report, page 1

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MEDICATION	DOSE	FORM	NO.	FREQ	# DISP	REFILLS	DAW

Prior plans: discuss transplant with family

Pending studies: (from 08/02/81) PTH

Comments: _____

_____

_____

Studies to be done: _____

_____

Rtn appt: _____ Signed: _____

Fig. 1b: Pre-encounter Report, page 2

patients being seen in the clinic for the first time, and a complete medical history and physical examination were recorded. Five notes were about patients seen for a new problem, and a complete review of systems was recorded. Three notes concerned patients evaluated for the possibility of dialysis therapy. The physicians used the notes to record information such as remarkable family histories, unproven diagnoses, and negative findings. However, in no instance did the traditional notes contain information that could not have been recorded on the computer report. Questionnable diagnoses can be coded as problems with "rule out" as a narrative modifier. Positive family histories belong in the problem list and negative findings on review of systems can be coded as subjective and physical findings. Use of the traditional notes fell off sharply during the study with 81% of the instances occurring during the first half of the study.

The physician group had three problems with the computer generated chart that could be addressed by modifying the program. The first difficulty was that physicians from other services who were not using the system did not know how to find information in the computer notes. This concern was addressed by generation of a narrative encounter note (Fig. 2) for referring physicians. These notes merge coded data and textual information from the computerized note pad into paragraphs. Positive findings are listed before negatives. Studies for which results have been reported are included in objective findings while pending studies are under plans. Therapies are grouped in plans as having been started, continued, or stopped on the day in question.

Another problem was that the computer preencounter report initially contained only active problems. Nephrology patients frequently have more than twenty problems and inactive problems were not printed to conserve space. Experience showed that management of active problems is influenced by inactive problems. For example, it is important to know that a hypertensive patient has a surgically repaired abdominal aneurysm. The report was changed to include all problems, and the gain in information was worth the space.

The final complaint was that in generating a computer printout each time a patient was seen instead of providing a cummulative paper chart in which to write, the system prevented the physician from making notes to himself or keeping simple time-oriented flow sheets to help manage the patient. The first problem was resolved by teaching the physicians to use the computerized note pad of the record as a reminder area. The second problem was corrected by adding a flow sheet (Fig. 3) of all subjective and physical findings,

THE NEPHROLOGY SERVICE
Category: HOME HEMO/HOME HEMO
Primary MD: WILLIAM STEAD 4-100
Occupation:
Employer:

10/12/81 11:26

* BROWN
RV * CHARLES F.
WWS * 12 SHULTZ BLVD.
* PATTFORD, QH. 21456
*002-123-1234
* Birthdate: 11/23/32
* 999-99-9997
*
* 49 yo wh div male
****

Subjective: moderate pruritis; no nausea

Objective: current weight-75 kg, dry weight-74 kg, sitting blood pressure 150/88 mm, mild arteriolar narrowing, pedal edema 1/4, right ankle reflex 2/4, normal lower extremity vibratory sensation, karnofsky status-95 %

HEMATOCRIT=23 %, GLUCOSE-NONFASTING=125 MG%, UREA NITROGEN=80 MG%, SODIUM=143 MEQ/L, POTASSIUM=5.6 MEQ/L, CHLORIDE=100 MEQ/L, CO2 CONTENT=22 MEQ/L, CALCIUM=8 MG%, PHOSPHORUS=4 MG%, ALKALINE PHOSPHOTASE=199 IU

Assessment: brother is willing to be a kidney donor; glomerulonephritis-memb; dialysis therapy; hyperparathyroidism

Plans: schedule tissue typing, continue basaljel 620 mg c 3 qid /c meals & snack, continue calcitriol .25 mcg c 1 qam, continue tabron 1 t 1 bid, continue fluoxymesterone 10 mg t 3 qam, continue trimeprazine tartrate 2.5 mg t 1 q6h prn itching, continue dioctyl na sulfosuccinate 100 mg c 2 po bid, calcium gluconate 1 gm t 1 qid. Disposition: return appointment

Fig. 2: Encounter Report

studies, and therapies recorded during the last nine encounters to the preencounter report.

Conclusions

Computerization of the medical record is achievable today provided the physician community will accept changes in the way the record information. An effective computerized record requires the imposition of discipline during data capture, but the record can be presented in different ways to meet the needs of the clinical community. Structured computerized records can replace the paper chart provided narrative text is allowed to provide for slight nuances. Narrative notes are still required when the physician wants to explain the logic behind the way that he interprets data. Such needs can be met by allowing either manual or computerized supplements to the core computerized chartless record.

References

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	01/30/72	02/15/81	03/25/81	05/02/81	06/05/81	06/25/81	07/05/81	08/02/81	09/10/81
PRURITIS									MLD
NAUSEA						Y	N	Y	N
WT KG	81	84	77	81	78	80	75	72	74
WT DRY KG						72	72	72	74
BP SIT MM	134/85	145/95	140/90	150/100	145/90	140/95	140/90	140/90	140/90
ART NAR		SEV	MOD	SEV	MOD	MOD	MOD	MOD	MOD
EDEMA PED	3	3	1	2	1	2	1	0	0
RFLEX AKR		2	2	2	2	1	1	1	2
VIB LE			NL						
KARNOF %			95						
HCT %					30		28	25	21
WBC THOUS		8.5							
SED WEST	65								
FERRITIN						900			
GLUC MG%			125	105	110	89	105	100	145
BUN MG%			80	90	105	140	80	89	78
NA MEQ/L			141	145	135	139	140	139	139
K MEQ/L			5.2	5.8	5.5	5	5	6	7.6
CL MEQ/L			100	105	95	97	95	93	99
CO2 MEQ/L			20	18	19	21	21	21	23
TP GM%			6.5	7	6.9	7	7	6.5	5.9
ALB GM%			3.8	4.1	4	4	4	4.2	3.4
CA MG%			9	8.3	8	8.8	9.1	8.5	8
PO4 MG%			2.9	5	5	4.5	4	4.1	6.1
CHOL MG%				210					
U AC MG%			7	7	7	7	7	7	7
CREAT MG%			7.5	9.1	10.5	11.1	16	16	15
TBIL MG%			1	.6	1	.9	1	1	.8
ALKP IU			100	130	140	150	150	160	180
LDH MU/ML			167	160	210	180	190	195	190
SGOT MU/ML			20	40	20	30	5	4	12
TXT-S-U		N							
CRCL ML/MIN		15							
PROT-UT GM/24 HR		1.5							
HAA							N		N
HAA AB		N							
KID BX	TEXT1								
CHEST		TEXT2							
BASALJEL MG		2480	2480	4960	4960	7440	7440	7440	7440
CALCITRIOL MCG				.25	.25	.25	.25	.25	.25
TABRON						2	2	2	2
FLUOXYMESTERONE MG						30	30	30	30
TRIMEPRAZINE TARTRATE MG									2.5P
DIOCTYL NA SULFOSUCCINAT MG		400	400	400	400	400	400	400	400
PREDNISONE MG	40.0A								
HYDROCHLOROTHIAZIDE MG	50								
MULTIVITAMIN		1	1	1	1	1			
FUROSEMIDE MG		80	80	160	160	160			

TEXT1 = DIF. THICKENING CAPILLARY WALLS /S INC. CELLULARITY; IGG&C3 GRANULAR PAT

TEXT2 = LVH, BILAT PUL EDEMA

Fig. 3: Time-oriented Flow Sheet